Development of an automatic method by remote sensing of chronological stages of deforestation-afforestation. The case of southern Chile

Nicolas Maestripieri, Gilles Selleron, Martin Paegelow

Development of an Automatic Method by Remote Sensing of Chronological Stages of Deforestation - Afforestation

The Case of Southern Chile

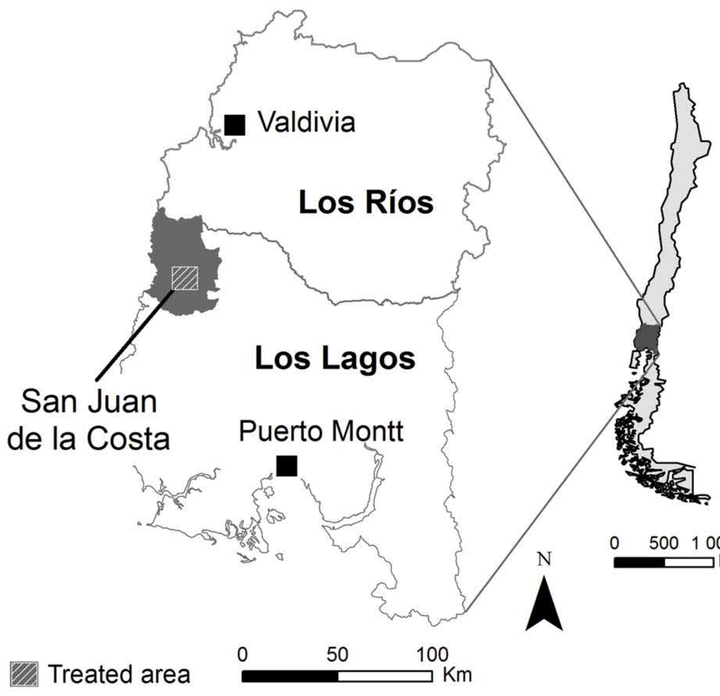
N. MAESTRIPIERI, G. SELLERON, M. PAEGELOW
GEODE - *GEOGRAPHY OF ENVIRONMENT*
UNIVERSITY OF TOULOUSE 2, FRANCE
nicolas.maestripieri@univ-tlse2.fr

1 SCIENTIFIC PROBLEMATIC

Huge spread of timber plantation (pine and eucalyptus)
Social and environmental impacts in a hotspot of biodiversity

Short-rotation, high yield clear-cut and genetic manipulation
Observed phenomena also in Uruguay and Brazil

Build a pluriannual model to detect, monitor and characterize the high cutting frequency of timber plantations using multidate imagery

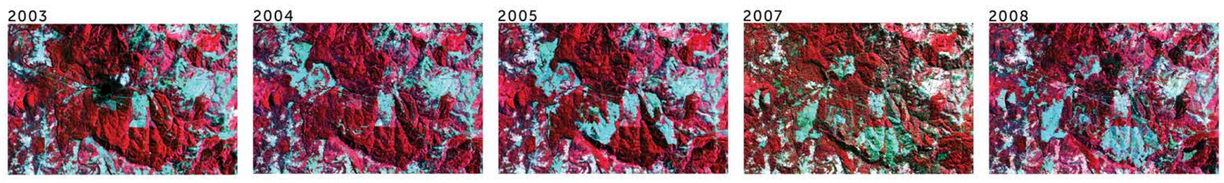


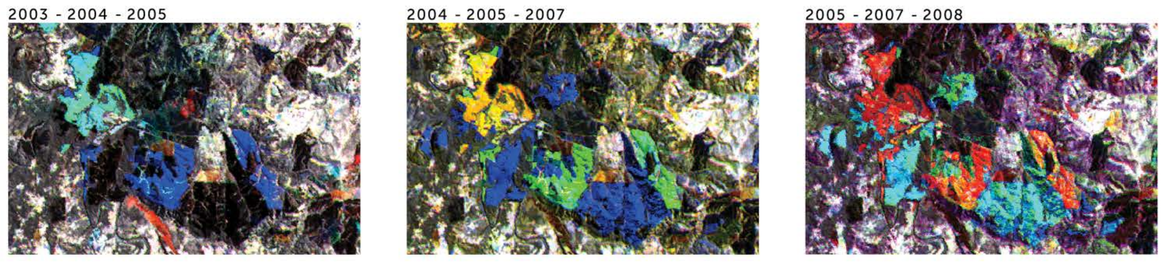
Typical landscape of timber plantation in the pre-coastal range - San Juan de la Costa

2 METHOD

From a classical vision of satellital imagery (IRC)...

...To multi-temporal imagery (Mid-Infrared wavelenght)



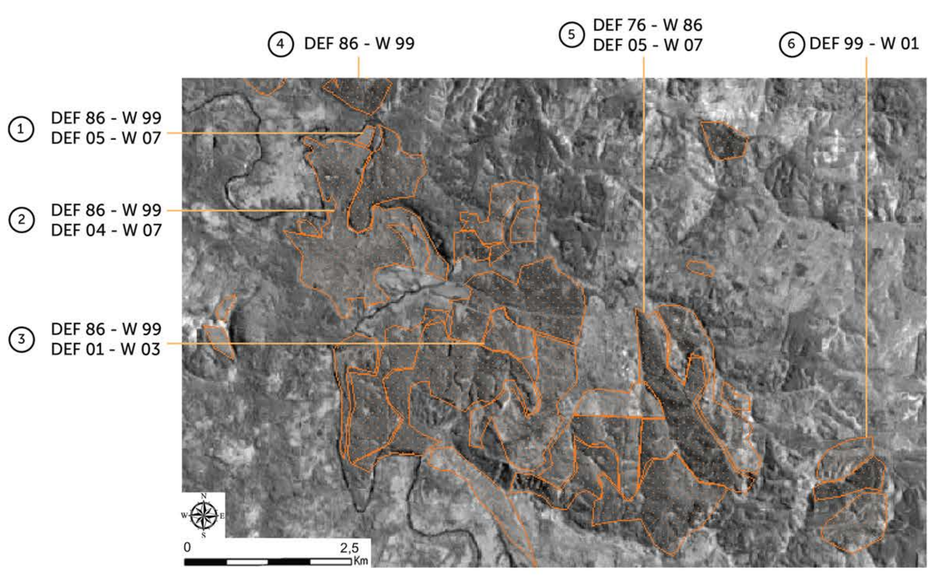


A trichromatic composition is built from spectral information taken from MIR along a temporal gradient of 32 years (1976 to 2008).

Dynamical interpretation grid which reflects stages of forest management in relation with pine/eucalyptus crop cycles.

COLOR ON SCREEN	DATE 1 (R)	DATE 2 (G)	DATE 3 (B)	INTERPRETATION
Red				Deforested D1 - Wooded D2 and D3
Green				Deforested D2 - Wooded D1 and D3
Blue				Wooded D1 and D2 - Deforested D3
Yellow				Deforested D1 and D2 - Wooded D3
Magenta				Deforested between D2 and D3
Cyan				Wooded D1 - Deforested D2 and D3
Black				Wooded stable
Grey / White				Deforested stable

3 RESULTS and DISCUSSION



Detection of forest rotation (DEF: deforested / W: wooded). Summary of the results

Forest rotation	1	2	3	4	5	6
Area (ha)	151.6	219.6	27.7	158.9	82.7	87.7

Area of forest rotation in hectare

Integration of forest rotation and a fallow period of 18 months allows the distinction between exotic species.

EUCALYPTUS - 8 years on average ① ②

PINE - 22 years on average ⑤

ABNORMAL SHORT-ROTATION - sanitary damages, fire ③

UNKNOWN SPECIES ④ ⑥

Validation with field surveys (GPS) and the Cadastre of Vegetation

OUTLOOK

Manual radiometric thresholding
Automatic classification

Systematize the treatments - extraction of time series
Couplage with official data (Cadastre of Vegetation Resources) and medium spatial resolution imagery MODIS